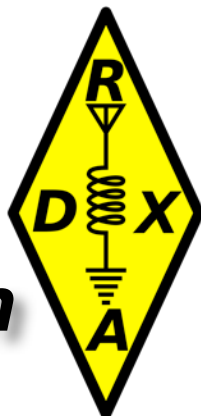


# **Rochester DX Association**



## **"dB's for Free"**

An outside the box process to evaluate and improve your restricted area antenna

### **Meeting presentation:**

Most of us have a typical home in a development, or at least on a relatively small lot, with average trees, etc., that precludes much of anything extensive for our antennas. And even if we are fortunate to have a modest tower and tribander, our low band antennas are necessarily compromised.

This month's presentation describes how to optimize an antenna restricted to that type of environment. It describes a process -- the key term -- which anyone can employ to get the most out of their limited situation.

Come have a look and listen.

**Tuesday, March 18<sup>th</sup>, 7:30pm  
Monroe County EOC  
1190 Scottsville Road**

## **The Annual Joint RDXA/RVHFG Awards Banquet.**

### **DETAILS:**

**When:** Saturday, April 26th at 7PM, 2014

**Where:** Lillian's Restaurant and Party House

**Address:** 2200 Penfield Rd.  
Penfield, NY 14526

**Time:** 6PM Cocktails & 7PM Dinner

## AWA “Spring Meet” May 3

by Bill Hopkins, AA2YV

We are still hunkered down for more winter, I suspect, so it's nice to think about our local spring and summer hamfests like Drumlins and Batavia (at Alexander). With the Rochester Hamfest put on hold for this year, these other meet-n-greet events for hams in our area can help take up the slack.

The Spring Meet of the AWA in Bloomfield, NY, offers a great way to enjoy hamfest atmosphere. Each year the event takes place on the first Saturday of May. This year that's May 3. This AWA “Meet” will give us added value. It will be the first May event at the New AWA Museum. One third complete, the Museum is already drawing admiring comments from hams, engineers otherwise situated and the general public. Visitor numbers have dramatically increased over past years.

The Meet will also give us that essential flea market experience. Since we expect a good Rochester area turnout, the pick of junque and jewels will certainly be increased.

The AWA will also have many items for sale to include Heathkit and other name brand test gear at the Auction. This promises to be a seldom event. Of course, you can always stop by the Museum any time it is open and buy gear on display right out of the Museum Gift Shop.

At the Museum Grand Opening on August 20, 2013, visitors enjoyed the first special exhibit, Heathkit radio gear and test equipment I'm told that the special exhibit in store for us in May will be Hallicrafters.

So arrive at 8 a.m. when the event opens to see who else has thawed out. But if you want to sell your stuff, you may arrive at 7 a.m. to set up. Tailgate outdoors or better still, indoors on a table. There will be a lot of space in the Old Annex where the AWA used to be. And if you want to sell at the Auction, Ed will gladly work to get the best price for you.

The Meet always has a special presentation. This year Roy Wildermuth (W2IT) will have an interesting show-operate-n-tell program: **“Stealy Flattery: How Stalin Copied the U.S. ART-13**

**Transmitter,”** that will run from 9:30 – 10:30, in the nearby Veterans Hall.

At 10:30 Ed Gable (W2MP) will be in high dudgeon, sporting his AWA baseball cap, to auction off the “goodies,” including yours, if you want to sell that way. Ed asks that you offer no more than four items for sale. Sellers at auction will need to disclose their minimum price and the condition of the item on a form to be supplied. The AWA will assess a 10% fee of the selling price up to a maximum of \$50. (This fee is for the Auction event only.)

Then the Museum will open at noon for tours.

It's new, it's cool, it's your Museum. No sense telling you now what standing exhibits you will see. That would spoil the fun.

If you're new to the area or maybe even the AWA Museum, here is how to find the Spring Meet. From Rochester drive through Victor on Highway 96. Flip right (south) at the traffic light onto 444 and up Boughton Hill past the Gonandagan historic Indian site, straight towards Bloomfield, then through it's traffic light and on over the rise where you hit US 5/20. Turn left there, eastward (watch the crazy traffic!), and the Spring Meet will take place at the former Old Museum Annex about 150 yards on your left. Watch for the sign out front. (It's 7 miles from Victor to the destination.) The Museum is across the road on the right, by the way.

The entrance fee is the same as last year: \$5. The cost to sell, whether inside or tailgating, is an additional \$7, and the reduced entrance ticket for the Museum will be \$5. However, if you are an AWA member, admission to the Museum is always FREE. Remember, the Museum opens at noon. And of course, there will be coffee and donuts at the Veterans Hall.



# A Compromise Antenna System: Synthesis and Performance Evaluation

N2UJN (Michael Sanchez)

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## Synthesis of 10m-17m + 40m HF Band Access

Entering HF for the first time is an exciting, but, sometimes bewildering walk through antenna systems available for build, or purchase (even with access to google, RARA and RDXA). As I re-entered the amateur radio hobby in 2013, my initial focus was to learn the exam content, and, quickly and with low cost, access appropriate bands in the early phases of passing the exams. I had not previously participated in HF, and, participating in 2m repeater activity does not really prepare the new ham for the myriad of radios, the multiplicity of bands and the very large number of antenna systems available for HF.

The choice to start small and “get” on two bands, CB and 10m, offers some benefits for those migrating from CB to Amateur Radio: 1) It narrows the choices of commercially available antenna systems thereby dramatically reducing the research time to understand the antenna choices available, 2) it is easy to build a half wave vertical or horizontal antenna for 11m that also works on 10m, 3) the verticals that are commercially available for CB are inexpensive, well reviewed, easy to install, and (much) less expensive to erect than almost all “Amateur” commercial antenna systems, and 4) there are actually a fair number of active CB radio enthusiasts in the Rochester area who are, now, also Amateur Operators active on both HF and VHF. These active CB enthusiasts enable use of the antenna on 11m (locally + legally).

**Goal of this short paper:** Having made conscious compromise antenna choices in construction, derive a methodology for evaluating that antenna system performance relative to my requirements.

### *Antenna System Evolution...the origins of compromise*

After extensive reviews, and, with a desire to access 10m and 11m initially, I purchased a “Solarcon Max 2000”. The Solarcon Max 2000 has a 22 foot length of wire that is fed with an inductor and capacitance matching section at the base. With the fiberglass support system the antenna spans a respectable 24 feet.

A reasonably large set of eham.net reviews, and, on-line references are available for the Solarcon Max 2000 antenna. In addition to mostly positive reviews, the antenna weighs a mere 9 lbs, takes about 5 minutes to put together not including opening the box, and, costs \$106. With my limited goals of entering the hobby and learning, without an excessive expenditure and time investment, this antenna seemed like a good start.

After initial install, the Solarcon, mounted about 7 feet off the ground, no radials, could be fully utilized with the auto-tuner of my radio for 10m, 11m, 12m, 15m, and 17m!! For 17m the SWR was the highest at around 2.5. With just this setup, and, nothing else, I ended up garnering around 40 confirmed countries between December 2013 and June 2014.

In June of 2014, the Max 2000 vertical was elevated to 25 feet at the base with a Rohn 9H50 push up mast. After elevation to 25 feet, SWR on 17m transformed from usable 2.5:1 to unusable 8.0:1! My heart sank. After substantial experimentation, SWR was reduced, for 17m, from 8.0:1 to 1.8:1 by adding 16.1 foot radials interleaved along the upper guy ropes.

The idea for adding custom radials came from two sources:



1) PA5COR had documented the addition of 17 foot counterpoise radials for his rooftop Solarcon Max 2000 install to optimize 17 and 20m. He emailed me his rooftop installed SWR data which supported the use of the 17 foot radials.

2) W8JI had posted simulation results showing the coupling of the Max 2000 to the mast system for a few metal mast lengths. W8JI uses these examples to explain why some folks hate the Solarcon, and some folks love it. The randomized selection of mast length makes the antenna “good” or “bad”.

Two hypotheses were derived to explain the SWR reduction with radials: a) the radials act as a big, physical capacitor between ground and radial system, sort of mimicking an antenna tuner (provided by K3DAV), b) the radials tune the antenna feed-point by enabling a return flow through a counterpoise “ground” return (provided by Gene Fuller and thank you).

Immediately after elevating the antenna and optimizing it with custom radials I made a now confirmed contact in Hong Kong on 17m one Sunday morning and Australia within a week. Ad hoc data I imagined indicated improved reception and transmission at the elevated height.

Later in summer, during an RDXA conversation, it was recommended to erect a 40m Dipole. But how? I have no big trees. After some thinking, I decided to use the 9H50 mast to support both the Solarcon and the 40m dipole in an inverted V. The 40m dipole was attached immediately below the Solarcon Max 2000 and erected to 25 feet in August 2014.

Implementation of the dipole below the vertical effectively added two more 30 foot radials to the overall system.

After 40m Dipole install, the SWR for the Solarcon had improved for 15m. Yes! No more up and down SWR optimization of the Solarcon radials! Now, just had to tune the 40m Dipole by folding it back... completed in time for NY QSO party.

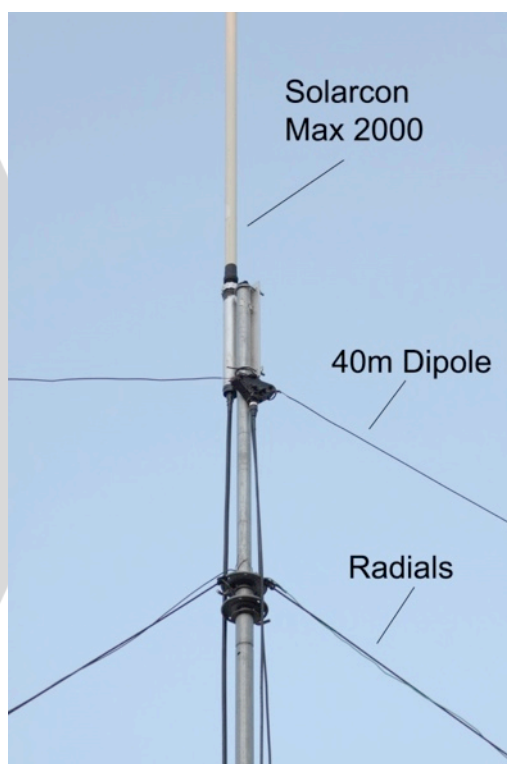
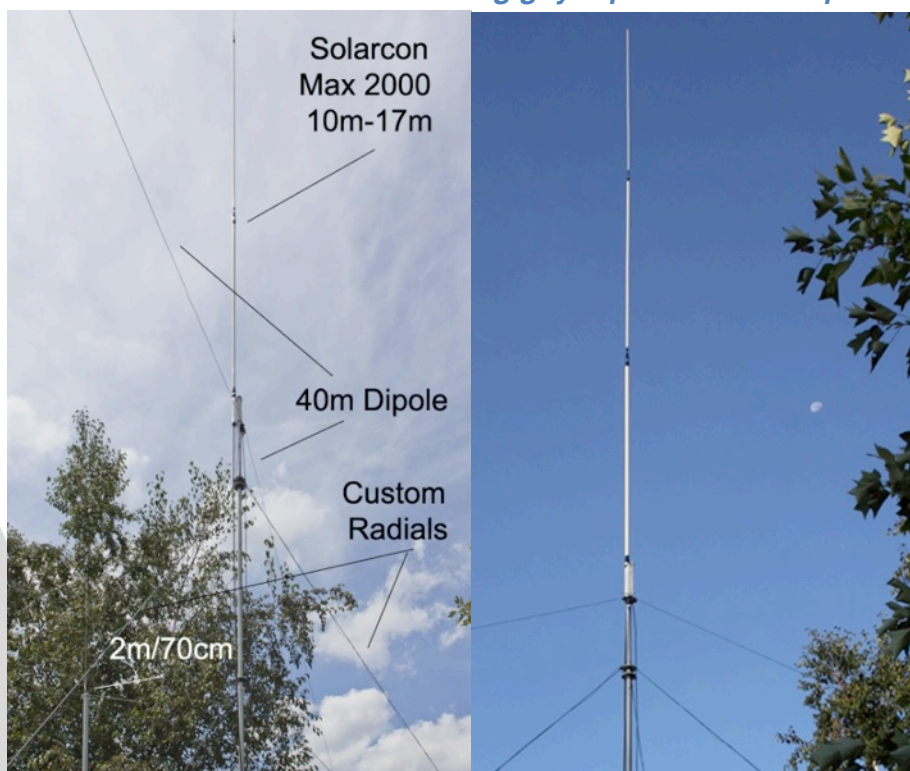
How to evaluate the combined antenna system for real performance?

Contacts? Perception? eham.net reviews? How much effort it actually ended up taking just to get this simple system up? Looks? All of these, I think, influence my own thoughts about the antenna system.

Or data? And, what data might that be?

## Visuals of the Antenna System

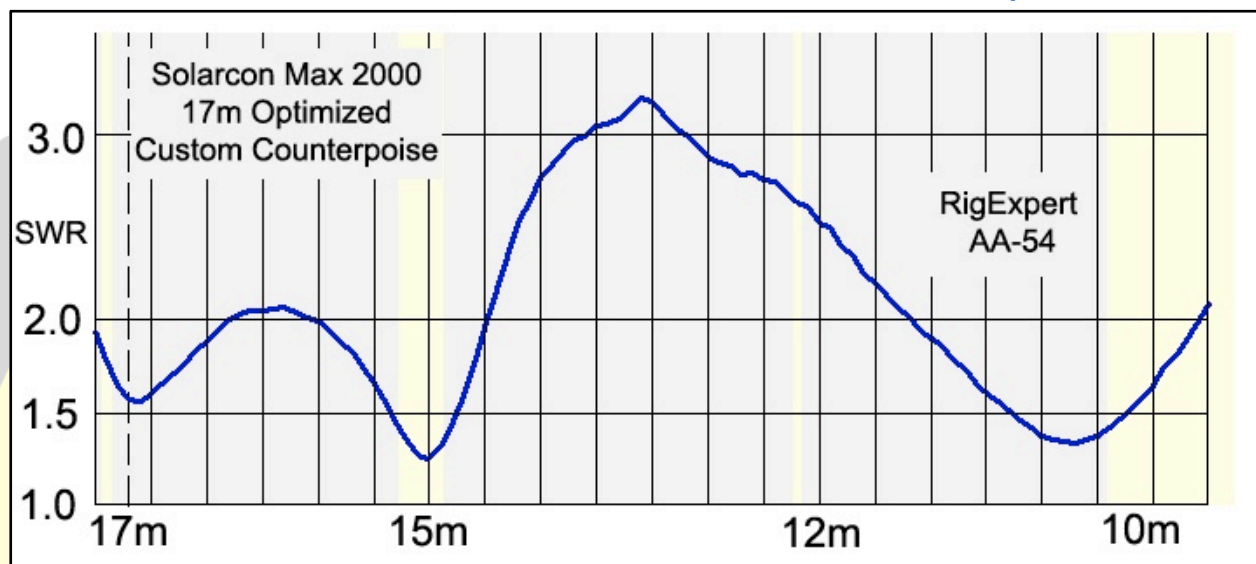
*Figure 1: Solarcon Max 2000 with custom radials along guy ropes and 40m Dipole.*



## Analyzing the Antenna System SWR Data

Acquisition of a good tool to measure SWR initiated my overall quest to quantify my antenna system. SWR, as measured by the RigExpert AA-54, is shown below in Figure 2.

**Figure 2: SWR of Max 2000 vertical installed above custom radials and 40m dipole**



From the above SWR trace, it is clear that, with a radio auto-tuner, the Solarcon system described can transmit on 10m, 11m, 12m, 15m and 17m.

*As many have hastened to tell me "a dummy load can also be used on those bands".* But, by the time I quantified the Solarcon SWR completely, I had already made many contacts worldwide. Clearly, I am not using a dummy load.

But, what am I using?

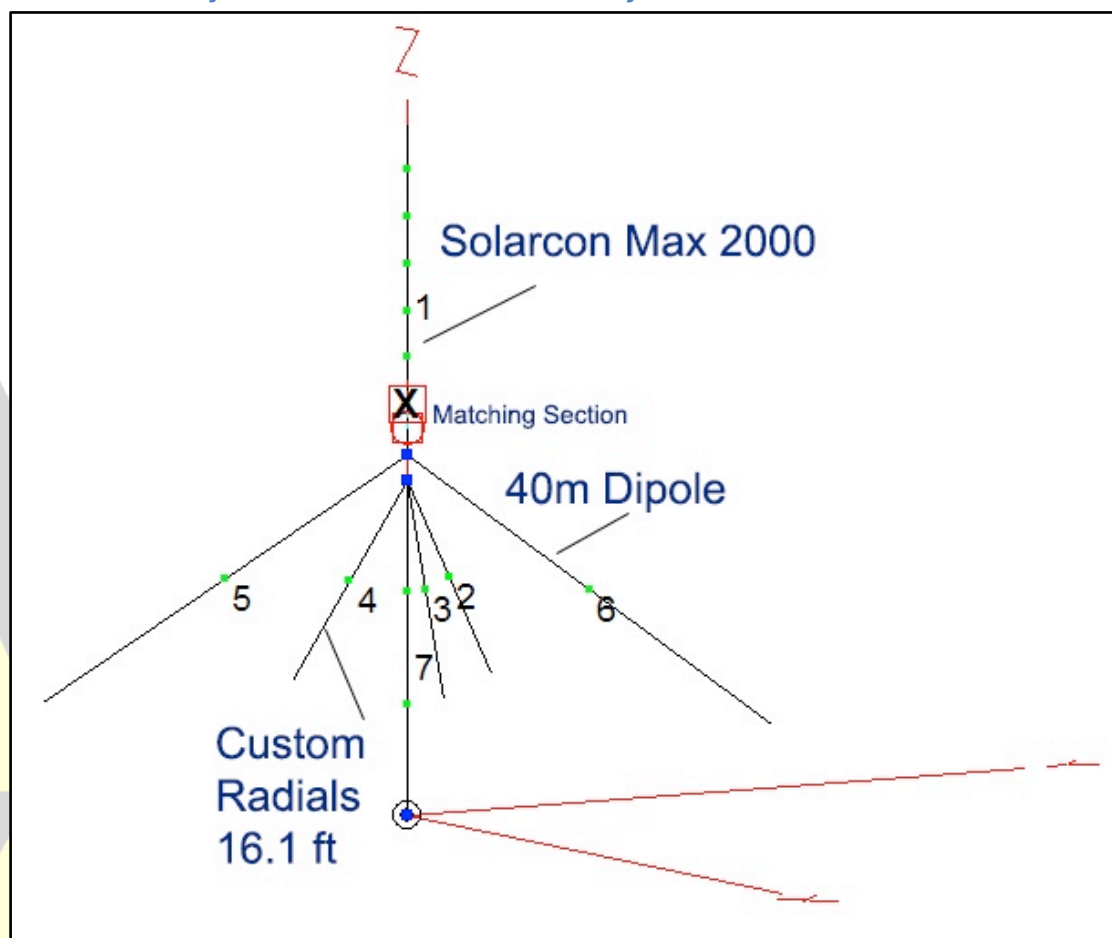
How to evaluate the potential for quantitative performance?

## Analyzing the Antenna System Propagation – EZNEC Simulation

After reading a Monroe county library copy of the ARRL antenna book I resolved to spend a little time learning enough about EZNEC to test my antenna system. Simulation, coupled with antenna experience is one way to acquire more data around antenna performance.

Knowing all lengths and heights, I constructed the EZNEC wire model shown in Figure 3 below.

Figure 3: EZNEC Model System for Solarcon Antenna System described.

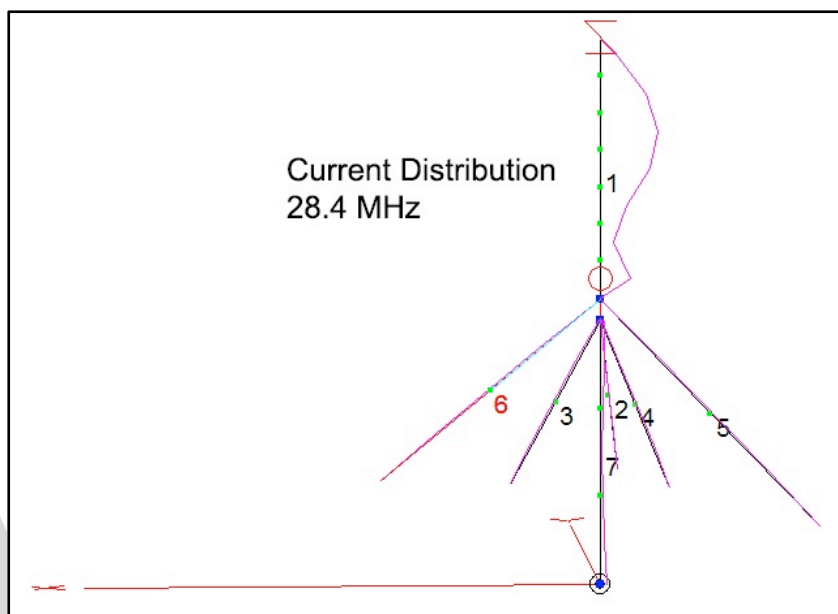




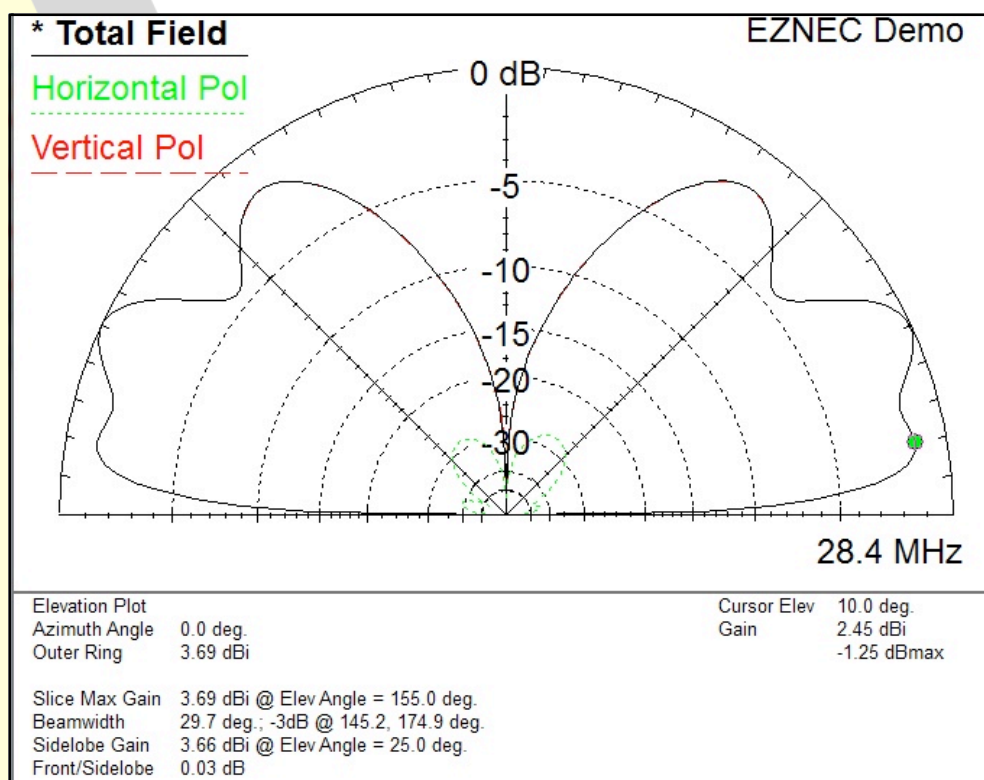
## 10m Current Distribution, Gain, Far Field Elevation Pattern

After a search to understand upstate NY soil dielectric constant and ground characteristics, and programming these into EZNEC, “real ground”, the below results for 10m were derived.

**Figure 4: 10m Current Distribution**



**Figure 5: 10m Far Field Elevation Pattern**



## 12m Current Distribution, Gain, Far Field Elevation Pattern

Figure 6: 12m Current Distribution

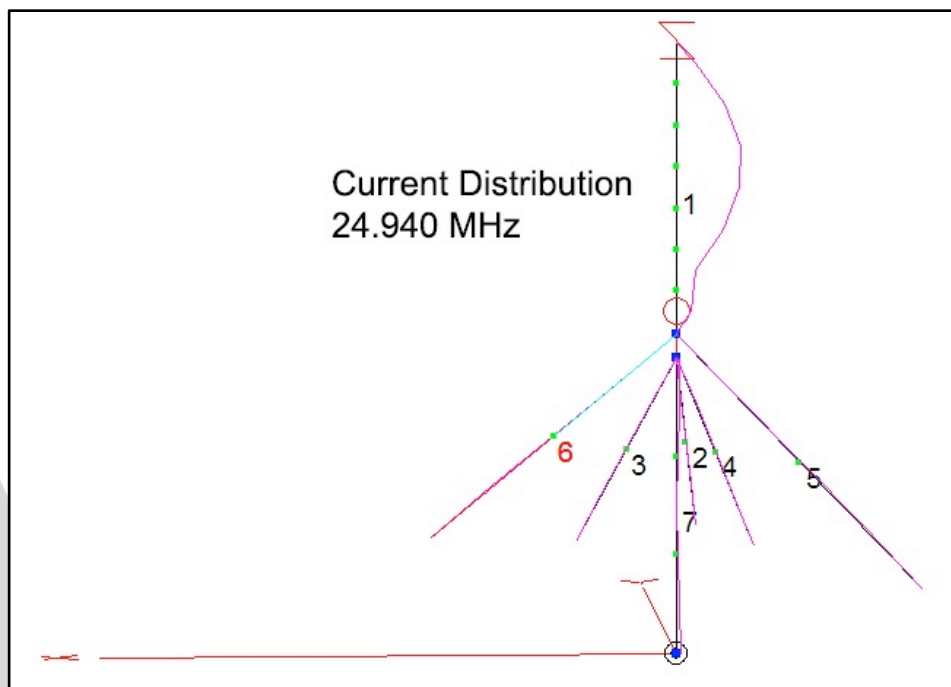
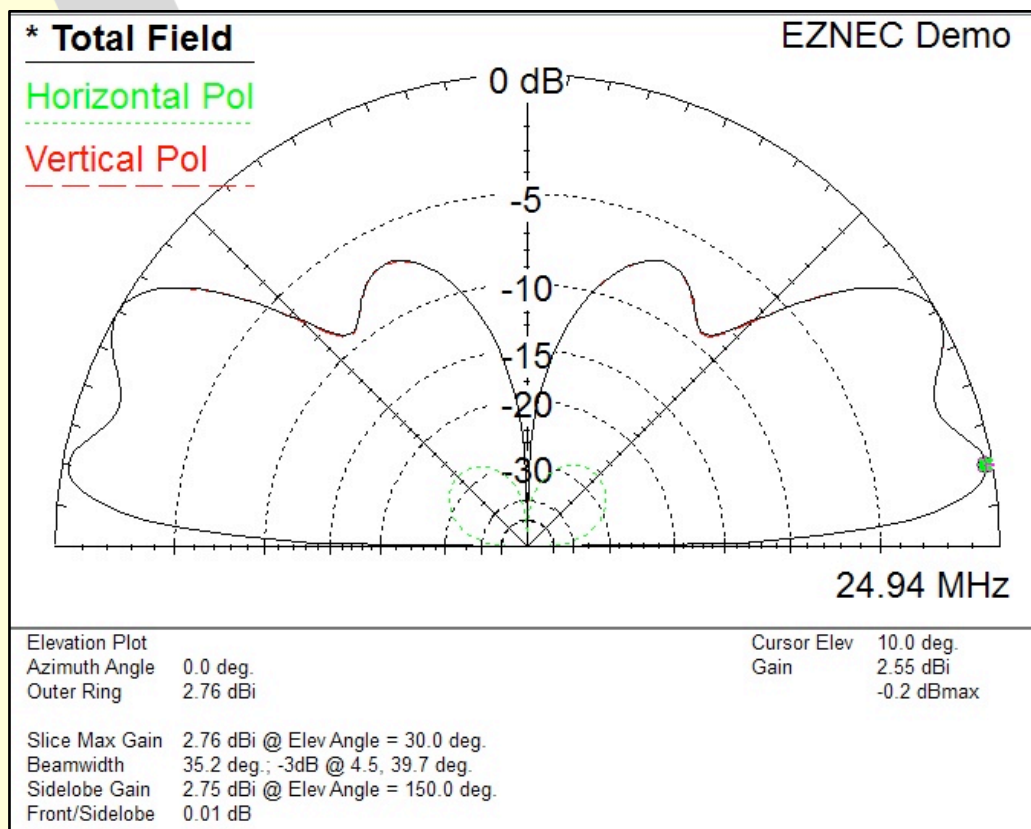


Figure 7: 12m Far Field Elevation Pattern



## 15m Current Distribution, Gain, Far Field Elevation Pattern

Figure 8: 15m Current Distribution (note the conducting mast response)

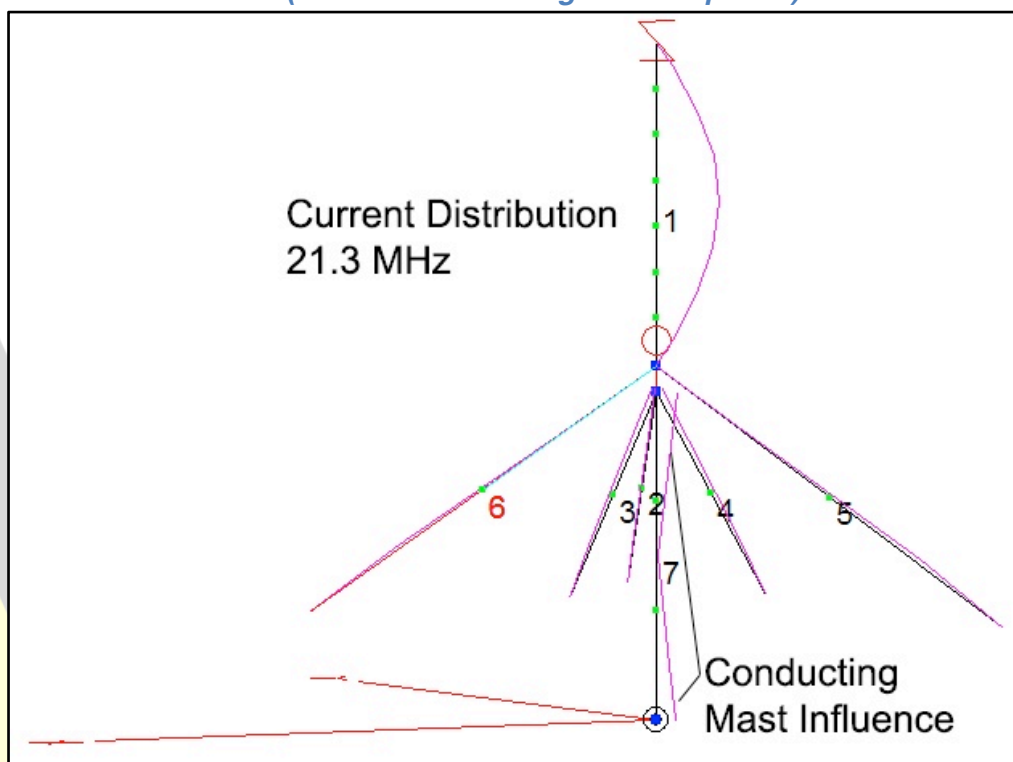
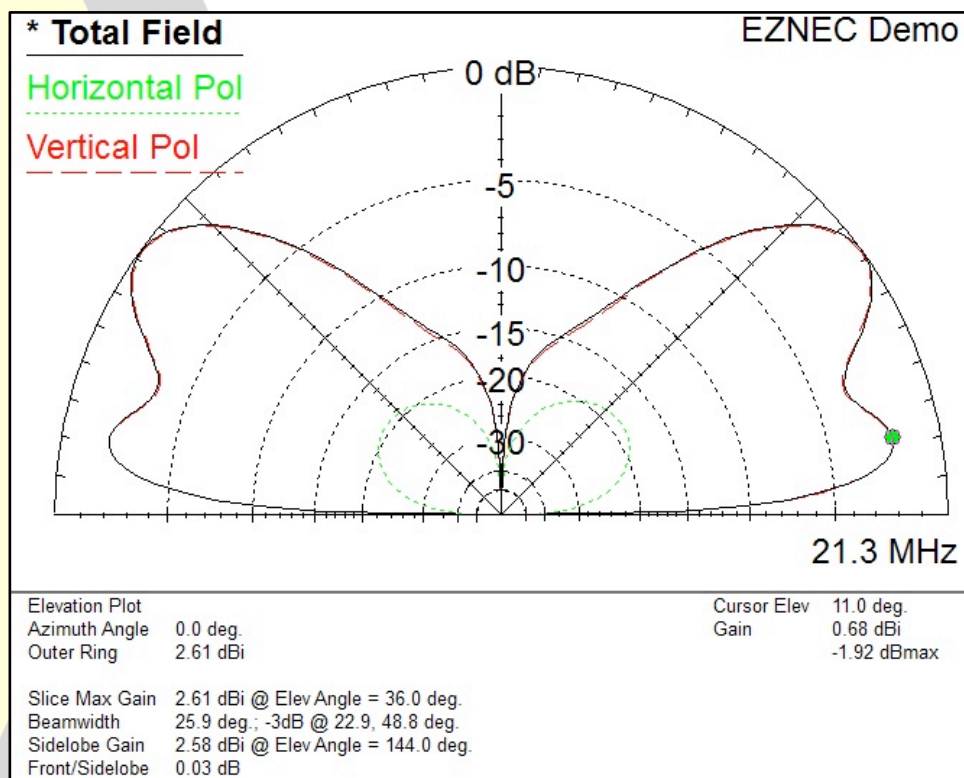


Figure 9: 15m Far Field Elevation Pattern



## 17m Current Distribution, Gain, Far Field Elevation Pattern

Figure 10: 17m Current Distribution (note the conducting mast response)

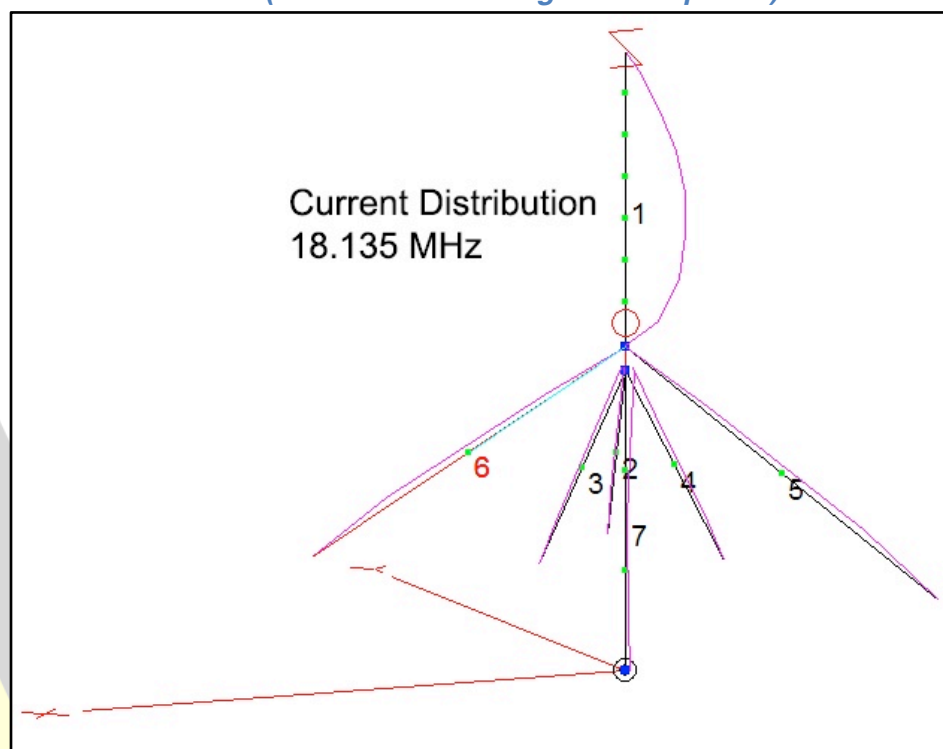
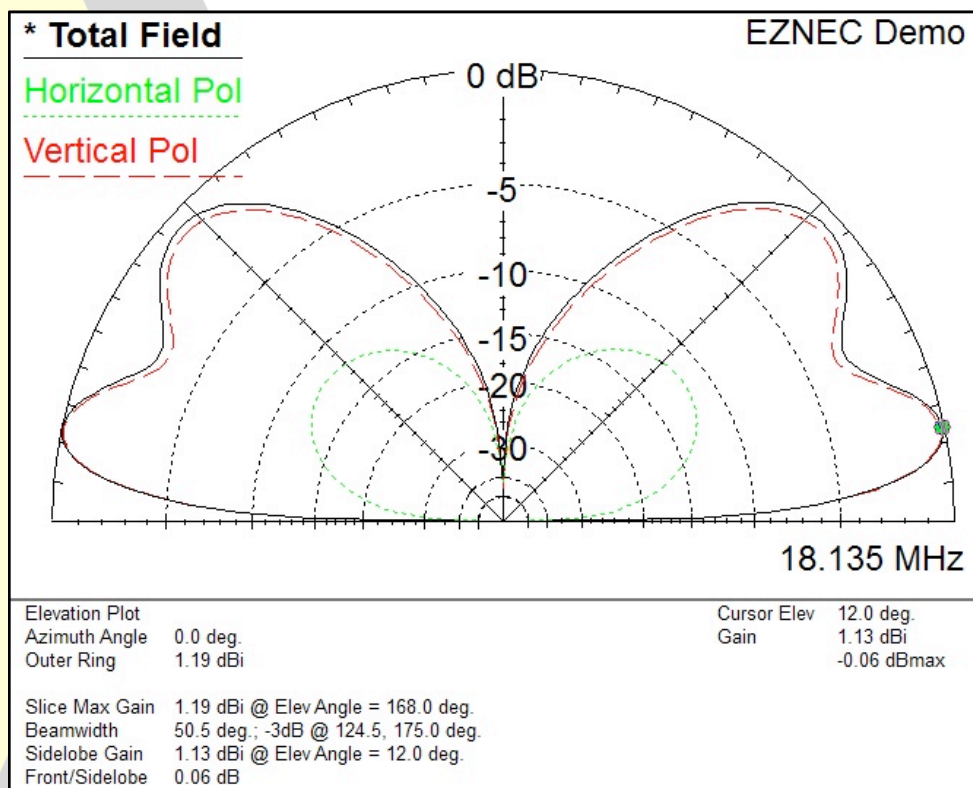


Figure 11: 17m Far Field Elevation Pattern



## Simulation Results and Summary

### *Gain Results and Take Off Angles:*

Band	Gain (dBi) lowest angle lobe	Max Gain (dBi)
10m	2.45 (10°)	3.69 (25°)
12m	2.55 (10°)	2.76 (30°)
15m	0.68 (11°)	2.61 (35°)
17m	1.13 (12°)	1.19 (12°)

There is essentially no marketing for the Solarcon Max 2000 Antenna that I could find. However, I did find some references indicating “4 dB” gain. This is almost true, but, that number without a takeoff angle and band ID is almost useless.

#### *10m analysis*

Solarcon system offers respectable gain of around 2.5 dBi on 10m and 12m at very low radiation angles.

At the higher angle lobe of 25°, for 10m, 3.7 dBi gain is excellent for a vertical. This higher angle is good for domestic contacts, some Northern European, Mexican, and South American contacts.

#### *12m analysis*

Gain of around 2.5 dBi and radiation angle of 10° are again, good for a vertical. Also, a secondary lobe having gain of around 2.8 exists at 30° for shorter range contacts. This band is only one I can get to Australia on.

#### *15m analysis*

Let's just say this is dismal gain of 0.67 for the low angle lobe of 11°. My experience in attempting to get through 15m DX pileups supports the low gain number. It is hard for me to break a 15m pile-up, and, requires very careful listening and several calls. However, for PSK-31, I have no problem making many contacts. And, for clear, good propagation in the evenings, I have JA contacts in the Extra portion of the band where congestion is light.

Why such poor gain? I have analyzed this and understand the origin to be interaction with the metallic mast. If you look carefully at the mast you will see a big current response...on a grounded mast. This robs 15m of low angle gain, and, is opportunity for change.

#### *17m analysis*

Gain is not large for 17m, but, angle is low at 12°. I have so many good contacts on 17m with this performance definition that I begin to understand the important role of atmospheric propagation. In fact, it was 17m that I made a 100W contact with FT5ZM, Amsterdam Island, 11,000 miles away.



## Conclusion and Summary

The Solarcon Max 2000 modified with elevated radials and a 40m dipole “radial” has good performance on 10m, and 12m through the eyes of EZNEC simulation, and, also, through the many, many contacts made on these bands during good and fair propagation days.

However, although I have many contacts on 15m, before I developed this simulation, I already had a “feeling” that something was amiss in terms of 15m long distance DX. Sometimes I am not heard in pileups, and, sometimes I am not able to get through even when a single call is made on this band for long distance. However, for shorter distances to domestic USA, I have no problems, and, this result is probably the secondary lobe at the higher gain and higher radiation angle.

**17m is a puzzle.** The simulated gain is not large, but, I have many, many long distance contacts on this band including Hong Kong, China, and, Amsterdam Island. ***For me, the conundrum of not great gain, but, many absolutely great contacts is something to attempt to better understand.***

This walk through the limitations and constraints of antenna design, and construction which preceded understanding via simulation, has been fascinating. Partly because I did NOT understand the limitations of the antenna, I approached the antenna system positively, was willing to pretty much try anything, and, was always optimistic I could make the system work. Almost always, I do, and, only with 100W peak.

17m is my favorite band for so many reasons. The European and JA stations that frequent this band are the absolute model of professional courtesy. Furthermore, many wish to have a real QSO involving station discussion, antenna discussion and are genuinely interested in the technical aspects of the hobby.

Lastly, for me, 17m is the “magic” band. My compromised antenna system performs like a beam with an amp (well, it works well). I get Hong Kong, I get Amsterdam Island through a monster pileup with two calls on phone...with 100W!! Not sure how honestly. But, I am sure I am happy as a clam to have done it!

My requirements: low cost, solo install, OK performance and access to HF bands for General license, low visual foot print, and good performance. My analysis indicates these requirements have been met.

This ongoing walk through better comprehension of my antenna system has been fascinating, not high cost, did not result in injury, did result in spending some time building stuff with my son, did require me to plan, think, and do, always a good thing,

.....and, has resulted in some great contacts given the modest system capability.

## **28th Annual Drumlins Hamfest**

### **April 5, 2014**

Open to the public, 8am  
Palmyra VFW Post 6778  
4306 Route 31, Palmyra, NY  
3 Miles east of Palmyra  
5 Miles west of Newark

**Breakfast – GRAND PRIZE – Door Prizes**

**Admission \$5.00**

Tables (6 ft.) \$5.00 - Tailgaters \$3.00

FREE Amateur License Exams will be held at the Hamfest site

Registration & Testing 9am - 11am

Walk-ins accepted Test Doors open at 8:45 AM

For more info call or email Sabrina

Tel: 585-727-2091, Email: [WD2STK@yahoo.com](mailto:WD2STK@yahoo.com)

<http://www.drumlinsarc.org/hamfest.htm>



## **Auburn's 2nd Annual Swap Meet**

**Saturday May 3rd (first Sat. in May)**

**7am to noon**

Located at the old GE plant parking lot  
GPS: 357 Genesee Street Auburn 13021  
Next to the McDonalds Resturant

Admission is \$3.00 at the gate or a bag of (unexpired) canned goods. All proceeds will be donated to a local Food Pantry.

Come join us at a great little Saturday morning Swap Meet.

There are no shelters, food or bathrooms.

However, McDonalds is 100 ft east of the Swap.

Hot coffee and rest rooms are available next door. If it rains, plan accordingly.

## Batavia Hamfest

Saturday - July 19, 2014



**Alexander Firemen Grounds** [MAP](#) - \$5.00 admission and free tailgating  
10708 Alexander Rd. Route 98, One mile south of Rt 20 , Alexander NY14005

**Outdoor Flea Market** - with the same venue as prior years    6:00am - till  
**Buy / Sell - VE Exam - Ham radio vendors - electronic equipment**  
Overnight Camping Allowed - Arrive after 6PM on Friday ( the night before hamfest )



## Rochester DX Association

Club Station — W2RDX

Club Website — <http://www.rdxa.com>

This Bulletin is the official publication of the Rochester DX Association and is published monthly, September through June. Email your articles, tips, ham ads, etc. to Andrew, W2FG at [alesny@rochester.rr.com](mailto:alesny@rochester.rr.com) by the second Tuesday of the month for inclusion in that month's issue.

All those with an interest in amateur radio and DXing and contesting are cordially invited to any meeting and to join RDXA. Meetings are held at 19:30 Local time on the 3rd Tuesday of each month, September through June.

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Regular Membership	\$20.00
Family Membership	\$5.00
Full-Time Student	\$5.00
Lifetime Membership	\$200.00

**Any other correspondence to: Irv Goodman, AF2K**

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